QUARTERLY REPORT – PUBLIC PAGE

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Prepared For: United States Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Office of Pipeline Safety

Project Title: Validation and Documentation of Tensile Strain Limit Design Models for Pipelines

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Progress to Date

This project, funded by PHMSA, PRCI, and several other industry partners is aimed at developing strain capacity models and documented procedures for establishing tensile strain capacity limits. Industry partners directly participating in the study include BP, Chevron, Duke, El Paso, Enbridge, ExxonMobil, Gassco, Gaz de France, IPSCO, JFE Steel Corporation, Lincoln Electric, Nippon Steel, Pacific Gas & Electric, Petrobras, Saudi Aramco, SoCalGas, TransCanada PipeLines Limited, TAMSA and Williams.

The primary objectives for the research are to:

- obtain high quality test data to identify the dominant parameters governing the tensile strain capacity of pressurized pipes;
- building on previous work, apply test data to assess the accuracy of existing numerical and engineering models, modify the models to improve accuracy and identify requirements for second generation model development;
- prepare a state-of-the-art guidance document to establish tensile strain limits based on existing SBD models; and
- develop second generation tensile strain limit models and SBD procedures.

These objectives will be achieved through a well planned and executed experimental testing program from small- to medium- and large-scale, and advanced computational modeling that reflects material's micro-scale response and global structure response.

The project is comprised of the following tasks:

1. Initial Analysis and Test Matrix Development
2. Pipe Acquisition and Specimen Fabrication
3. Small-Scale Material Tests
4. Full-Scale Small Diameter Pipe Tension Tests
5. Analysis of Full-Scale Small Diameter Pipe Tension Tests
6. Full-Scale Large Diameter Pipe Tension Tests
7. Medium-Scale Curved Wide Plate Tests
8. Model Verification and Modification
9. Initial Guidance Document Preparation
10. Progress, Planning and Review Meetings
11. Reporting and Final Presentation
12. Program Management
13. Focused Presentation to PHMSA/OPS

Eight full-scale small diameter pipe tension tests were completed in this quarter. The first round of four tests had no welds in the pipe body. The primary purpose of these tests was to establish the effects of internal pressure on the tensile strain capacity of plain pipe materials. The second round of four tests had artificial notches cut into the weld centerline and into the heat-affected zone (HAZ). For both plain pipe and welded pipe specimens the tensile strain capacity was markedly reduced by the application of internal pressure.